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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/537,944	08/07/2006	Pulickel Ajayan	047182-0141	6885

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FOLEY AND LARDNER LLP
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WASHINGTON, DC 20007

EXAMINER

PATEL, PUNAM

ART UNIT	PAPER NUMBER
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2855

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/537,944	Applicant(s) AJAYAN ET AL.	
	Examiner PUNAM PATEL	Art Unit 2855	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
4a) Of the above claim(s) 18-22 and 36-44 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 23-35 is/are allowed.
- 6) ☒ Claim(s) 1,3,6 and 9-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 June 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>2/28/07, 8/7/06, 6/9/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claims 1-17 and 23-35, drawn to a sensor and the method of making said sensor.

Group II, claims 18-22, drawn to an antenna.

Group III, claims 36-44, drawn to a method of making a composite material.

The inventions listed as Groups I-III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The inventions of groups II and III lack two electrodes electrically contacting an array of carbon nanofibers/tubes (the special technical feature of Group I).

The inventions of Group I and III do not operate as an antenna (the inventive concept of Group II).

The inventions of Group I and II do not require curing a matrix film of aligned carbon nanotubes (the inventive concept of Group III).

During a telephone conversation with Leon Radomsky (Reg. No. 43,445) on 08/04/2008 a provisional election was made without traverse to prosecute the invention of **Group I**, claims 1-17 and 23-35. Affirmation of this election must be made by applicant in replying to this Office

action. Claims 18-22 and 36-44 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Drawings

The drawings are objected to because Figs. 5-8 are unclear photographs; the disclosed “darker areas” are not distinguishable from the “paler areas”. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "the first material" in line 9. There is insufficient antecedent basis for this limitation in the claim. Claim 6 depends on Claim 1. There is no recitation of "a first material" in Claim 1. If the sensor of Claim 6 is "adapted to determine at least one of thermal effects, stress, strain, static build up, crack content, fracture content, and breakage content of the first material" then Claim 1 must recite some limitation teaching some sort of attachment to a first material. It is suggested that the applicant amend Claim 1, to recite such a limitation to overcome the lack of antecedent basis **or** amend Claim 6 to depend on Claim 4 (which does recite such a limitation).

Claim 12 recites the limitation "the first material" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 12 depends on Claim 1. There is no recitation of "a first material" in Claim 1. If the sensor of Claim 12 is "removable" then Claim 1 must recite some limitation teaching an attachment to a first material. It is suggested that the applicant amend Claim 1, to recite such a limitation to overcome the lack of antecedent basis **or** amend Claim 12 to depend on Claim 4 (which does recite such a limitation).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 10, and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Kalkan et al. (US 2002/0192441).

With respect to Claim 1, Kalkan et al. disclose a sensor system, comprising:

a nanosensor comprising at least one conductive channel comprising an array of substantially aligned carbon nanotubes or carbon nanofibers (#13, ¶ 24, and Claim 6, wherein the the nano-scale elements are formed of a carbon material) embedded in a polymer matrix material (#12 & ¶s 11, 28, and 30);

a first electrode electrically contacting the carbon nanotubes or carbon nanofibers on a first portion of the at least one conductive channel (#10 & ¶ 28);

a second electrode electrically contacting carbon nanotubes or carbon nanofibers on a second portion of the at least one conductive channel (#14 & ¶ 28). Also see ¶ 47.

With respect to Claim 3, Kalkan et al. disclose the sensor system wherein the conductive channels comprise the carbon nanotubes or carbon nanofibers extending length wise through the polymer matrix such that opposing ends of the carbon nanotubes or carbon nanofibers are exposed in opposing faces of the polymer matrix (Fig. 1).

With respect to Claims 10 and 11, Kalkan et al. disclose the electrodes being conductive pn junction diode film contacts (¶ 47).

Claims 1, 3, and 9-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Searls et al. (US 2004/0005736).

With respect to Claim 1, Searls et al. disclose a sensor system, comprising:
a nanosensor comprising at least one conductive channel (#26 & Abstract) comprising an array of substantially aligned carbon nanotubes or carbon nanofibers (#38, ¶ 15) embedded in a polymer matrix material (#40, ¶ 16);
a first electrode electrically contacting the carbon nanotubes or carbon nanofibers on a first portion of the at least one conductive channel (#24, ¶s 13, 19, 20);
a second electrode electrically contacting carbon nanotubes or carbon nanofibers on a second portion of the at least one conductive channel (#12, ¶ 24, wherein the die is metallized, and Abstract, wherein current flows from the die to the thermal management aid). Also see Fig. 1 & ¶ 23.

With respect to Claim 3, Searls et al. disclose the sensor system wherein the conductive channels comprise the carbon nanotubes or carbon nanofibers extending length wise through the polymer matrix such that opposing ends of the carbon nanotubes or carbon nanofibers are exposed in opposing faces of the polymer matrix (Fig. 3).

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With respect to Claim 9, Searls et al. disclose the array of carbon nanotubes arranged in the polymer matrix material such that they are perpendicular to the substrate (Fig. 3), wherein the nanotubes has a 1nm diameter and a length greater than .10mm (§ 14).

With respect to Claims 10 and 11, Searls et al. disclose the electrodes being conductive metallic contact consisting of bulk chip structures (§s 13, 19, 20, 24).

Allowable Subject Matter

Claims 23-35 are allowed. The following is a statement of reasons for the indication of allowable subject matter: With respect to Claim 23, the prior art made of record teaches the aligned carbon nanotube composite, but fails to teach or provide motivation for attaching said composite to a material and receiving information from the composite about the physical condition of the material. Claims 24-35 depend on Claim 23.

Claims 2, 4, 5, 7, 8, 13-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PUNAM PATEL whose telephone number is (571)272-6794. The examiner can normally be reached on Monday to Friday 9:30 AM to 6:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edward Lefkowitz/
Supervisory Patent Examiner, Art Unit 2855

PP
08/08/2008